**Little Heath Sixth Form**

**Mathematics** Personal Learning Checklist

**Student Name: ……………………….…………………………………..………**

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| **Unit Name:**  **Mathematics (Mechanics 2)** | **Unit Code:**  **MM2B** |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

*KEY:* ***Red =*** *with difficulty* ***Amber*** *= not sure* ***Green*** *= yes*

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| **GCSE Re-Cap (Skills and Knowledge from M1)** | **Red** | **Amber** | **Green** |
| * Be able to use components of forces Fx=F or Fy=F |  |  |  |
| * Know and use suvat equations |  |  |  |
| * Know and use the equation for Friction ie Fr |  |  |  |
| * Know and use **roruvat** in vector form |  |  |  |
| * Know and use F=ma |  |  |  |

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| **Skills/Knowledge/Specification** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * **MOMENTS and CENTRES OF MASS** |  |  |  |  |
| * Use Fd and Fd sin θ to calculate the moment of a force about a point |  |  |  |  |
| * Understand that clockwise = anticlockwise in equilibrium situations |  |  |  |  |
| * Calculate with moments when forces are given as vectors and points as co-ordinates |  |  |  |  |
| * Solve balance problems for uniform rods |  |  |  |  |
| * Solve balance problems for non-uniform rods |  |  |  |  |
| * Solve balance problems when on the point of tilting about one pivot |  |  |  |  |
| * Solve problems the equilibrium of a rigid body when the resultant force and the resultant moment are both zero |  |  |  |  |
|  |  |  |  |  |
| * Solve problems when all the forces are parallel ie horizontal beam or a ladder leaning against a wall |  |  |  |  |
| * Finding the centres of mass of a symmetrical lamina eg circles, rectangles |  |  |  |  |
| * Find the centre of mass , a system of particles using i =ixi and =iyi |  |  |  |  |
| * Find the angle made with the horizontal or vertical of a body when suspended from a given point |  |  |  |  |
| **KINEMATICS AND VARIABLE ACCELERATION** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Solve problems involving calculus where the position vector is given as a function of time ie = f(t) + g(t) + h(t) |  |  |  |  |
| * Solve problems involving calculus where the velocity vector is given as a function of time ie = f’(t) + g’(t) + h’(t) |  |  |  |  |
| * Solve problems involving calculus where the acceleration vector is given as a function of time ie = f’’(t) + g’’(t) + h’’(t) |  |  |  |  |
| * Solve problems by differentiating displacements or position vectors to give velocities for one two or three dimensions |  |  |  |  |
| * Solve problems by differentiating velocity vectors to give accelerations for one two or three dimensions |  |  |  |  |
| * Solve problems by integrating acceleration vectors to give velocities for one two or three dimensions |  |  |  |  |
| * Solve problems by integrating velocity vectors to give displacements for one two or three dimensions |  |  |  |  |
| * Find the maximum velocity at a given time |  |  |  |  |
| * Use initial conditions to find the constant of integration |  |  |  |  |
| **APPLICATIONS OF DIFFERENTIAL EQUATIONS** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Use F = m to form differential equations |  |  |  |  |
| * Solve differential equations of the form F = m by using ‘separating variables’ to obtain relationships between velocity and time. |  |  |  |  |
| * Use initial conditions to find the constant of integration |  |  |  |  |
| **UNIFORM CIRCULAR MOTION (HORIZONTAL)** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| Convert angular speed from revolutions per minute to radians per second |  |  |  |  |
| Know that velocity is tangential to a circle |  |  |  |  |
| Know that acceleration is directed towards the centre of the circle |  |  |  |  |
| * Know and use the relationships v = rω and a = r ω2 = |  |  |  |  |
| * Solve problems such as conical pendulums |  |  |  |  |
| * Use position, velocity, and acceleration vectors in relation to circular motion in terms of **i** and **j** |  |  |  |  |
| **WORK, ENERGY AND POWER** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Calculate kinetic energy using KE = 1/2mv2 |  |  |  |  |
| * Calculate gravitational potential energy using GPE = mgh |  |  |  |  |
| * Calculate work done by a force ie Wk Done = Force x distance = change in energy |  |  |  |  |
| * Use the conservation of energy |  |  |  |  |
| * Calculate elastic potential energy ie EE = and prove the equation |  |  |  |  |
| * Use Hookes’ Law to find the tension in a stretched elastic strings or springs ie T = |  |  |  |  |
| * Calculate Power as the rate at which a force does work, and the relationship P = Fv |  |  |  |  |
| * Solve problems involving maximum velocity and maximum power |  |  |  |  |
|  |  |  |  |  |
| **VERTICAL CIRCULAR MOTION** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Use the conservation of energy to solve problems |  |  |  |  |
| * Use F=ma towards the centre of the circle where a= or r ω2 |  |  |  |  |
| * Find the height gained by a given object using trigonometry |  |  |  |  |
| * Be able to solve problems in context such as a body on an inelastic string, Eskimo on an igloo, bead on a wire |  |  |  |  |
| * Know and use the condition for the body to make complete circles |  |  |  |  |

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| **REVISION**  **Use the information on this checklist to make revision cards and notes** |

**Grade tracking:**

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| *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
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| *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
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*Note: You should discuss this checklist regularly with your subject teacher/mentor*